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Mark Scheme (Results)

Summer 2014

Pearson Edexcel International GCSE Mathematics A (4MA0/3H) Paper 3H

Pearson Edexcel Level 1/Level 2 Certificate Mathematics A (KMA0/3H) Paper 3H

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Summer 2014
Publications Code UG039420

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
  Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - eeoo – each error or omission
  - awrt – answer which rounds to

- **No working**
  If no working is shown then correct answers normally score full marks
  If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**
  If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.
  Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.
  If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
  If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.
  If there is no answer on the answer line then check the working for an obvious answer.
- **Ignoring subsequent work**
  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.
  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.
  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.
- **Parts of questions**
  Unless allowed by the mark scheme part of the question CANNOT be awarded in another.

Apart from Questions 2, 14(a)(i), 14(a)(ii), 18, 19 and 23 (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1. (a)	89.7 ÷ 8.41....	10.66(053284)	2	M1 for 89.7 or 8.41 (Accept if first 3 sig figs correct) A1 Accept if first four sig figs correct.
(b)		10.7	1	B1ft ft if (a) > 3 sig figs
				Total 3 marks

Question	Working	Answer	Mark	Notes
2.	$\frac{4}{9} \times \frac{6}{5}$ oe	$\frac{24}{45}$ oe	2	M1 or $\frac{0.8}{1.5}$ A1 dep on M1. Accept $\frac{8}{15}$ if clear cancelling seen
	Alternative: $\frac{8n}{18n} \div \frac{15n}{18n}$ for any integer n	$\frac{8}{15}$ oe	2	M1 $\frac{8n}{18n} \div \frac{15n}{18n}$ A1 dep on M1. Answer must come directly from their method eg $\frac{16}{36} \div \frac{30}{36}$ must be followed by $\frac{16}{30}$ for M1A1
				Total 2 marks

Question	Working	Answer	Mark	Notes
3. (a)		Reflection (in line) x = – 2	2	B1 Accept, for example, reflect, reflected B1 Multiple transformations score B0B0
(b)		Shape in correct position	2	B2 Vertices at (1, –1) (7, –1) (7, –4) (4, –4) (4, –2) (1, –2) Condone omission of inner square and/or no shading and/or label C If not B2 then B1 for correct orientation but wrong position or rotation 90° anticlockwise about (0,0)
				Total 4 marks

Apart from Questions 2, 14(a)(i), 14(a)(ii), 18, 19 and 23 (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
4. (a)		$56\,d^2$	1	B1 cao
(b)		$12e - 20$	1	B1 Accept $-20 + 12e$
(c)		$f(f-2)$	2	B2 Accept $(f \pm 0)(f-2)$ oe If not B2 then B1 for factors when expanded and simplified give 2 terms, 1 of which is correct except B0 for (f + a)(f – a)
(d)	$2^3 + 6 \times 2$ or $8 + 12$	20	2	M1 A1 cao
				Total 6 marks

Question	Working	Answer	Mark	Notes		
5.	$\sin 38 = \frac{PQ}{12.2}$ or $\cos(90-38) = \frac{PQ}{12.2}$ oe			M1	12.2cos38 (9.61...) **and** $12.2^2 - "9.61"^2$ (= 56.4..)	correct statement of sine rule eg $\frac{PQ}{sin38} = \frac{12.2}{sin90}$
	("PQ" =) 12.2 x sin 38 or 12.2cos(90 – 38) oe			M1	$\sqrt{"56.4"}$	correct expression for PQ eg (PQ) = $\frac{12.2sin38}{sin90}$
		7.51	3	A1	awrt 7.51	
						Total 3 marks

Question	Working	Answer	Mark	Notes
6.	One bearing line at 260° (± 2°) or one 9.6 cm line (± 2mm) from A	Intersection of 2 lines in boundary of overlay	2	M1 A1 Condone omission of *D* label Correct position of *D* within tolerance without any lines scores M1A1.
				Total 2 marks

Question	Working	Answer	Mark	Notes
7. (a) (i)		{p, r, a}	1	B1 Withhold marks for repeats
(ii)		{p, a, r, i, s, b, u, d, e, t}	1	B1 Withhold marks for repeats
(b)		E no letters common to Prague and Lisbon	1	B1 dep on E in box Accept general reasons. e.g. "no letters common to sets A and E" or "they share no common letters" or "no intersection (between A and E)" or "no letters the same" or "no letter in A are in E".
				Total 3 marks

Question	Working	Answer	Mark	Notes
8. (a)		Correct line drawn	2	B2 Must be a single straight line passing through at least 3 of (0,4) (2,3) (4,2) (6,1) (8,0) (10,-1) If not B2 then B1 for a single straight line with a negative gradient passing through either (0,4) or (8,0) or at least 3 of (0,4) (2,3) (4,2) (6,1) (8,0) (10,-1) plotted or calculated
(b)		$x = 2$ drawn $y = 1$ drawn Correct region identified	3	B1 B1 B1 Ignore extra lines Accept R shaded or R′ shaded. Condone omission of label R
				Total 5 marks

Question	Working	Answer	Mark	Notes
9.	0.5 x 10 x 12 (= 60) or 13 x 8 (= 104) or 8 x 10 (= 80) 0.5 x 10 x 12 (= 60) and 0.5 x 10 x 12 (= 60) and 13 x 8 (= 104) and 13 x 8 (= 104) and 8 x 10 (= 80) or 2 x "60"and 2 x "104" and "80"	408	3	M1 One correct face M1 dep on M1 above (exactly 5 correct faces) A1 Award M0A0 for 0.5 x 10 x 12 × 8 and M0A0 for 0.5 x 10 x 12 = 60 followed by 60 × 8, etc
				Total 3 marks

Question	Working	Answer	Mark	Notes
10.	64 x 4 (=256) 70 x 5 (=350) "350" – "256"	94 or 94% or 94 / 100 or 94 out of 100	4	M1 0.64 × 400 (= 256) 0.64 × 4 (= 2.56) M1 0.7 × 500 (= 350) 0.7 × 5 (= 3.5) M1 dep on M2 "350" – "256" (3.5 - 2.56) × 100 A1 NB: 94 embedded in working but not on answer line gets M3A0 unless contradicted.
	Alternative (i): List of 4 numbers adding to 256 List of 5 numbers adding to 350 list of 5 is identical to list of 4 but also contains 94 eg 94,50,50,56,100 and 50,50,56,100	94 or 94% etc (as above)		M1 M1 M1 dep on M2 A1 permitted answers as listed for A1 above
	Alternative (ii): 70 – 64 (=6) (70 – 64) X 4 (=24) 70 + 24	94 or 94% etc (as above)		M1 M1 M1 dep on M2 A1 permitted answers as listed for A1 above
				Total 4 marks

Question	Working	Answer	Mark	Notes
11. (a)		$60 < v \leq 70$	1	B1 Accept 60 − 70 or 60 to 70 or 60 ➔ 70
(b)				M1 for $\frac{56}{a}$ with a > 56 or $\frac{b}{180}$ with b < 180 or 0.31 or 31% or $\frac{4+52}{4+52+60+34+18+12}$
		$\frac{56}{180}$ oe	2	A1 Accept answer written as an equivalent fraction, (eg $\frac{14}{45}$), or 0.311... (accept if first 3 SF correct) or 31.1...% (accept if first 3 SF correct) M1A0 for 56 : 180 or 14 : 45 oe
(c)		4, 56, 116, 150, 168, 180	1	B1
(d)	All 6 plotted correctly	points plotted Curve or line segments	2	B1 All 6 points plotted correctly $\pm\frac{1}{2}$ sq B1 ft curve/line segments from points if 4 or 5 plotted correctly or if all 6 points are plotted consistently within each interval of frequency table at the correct heights ($\pm\frac{1}{2}$ sq). Accept curve which is not joined to (40 , 0)
(e)	vertical line or mark drawn at 84 km/or horizontal line corresponding to speed = 84km (± ½ sq) on cf graph.	20 – 26 inclusive	2	M1 for 84 indicated on cf graph A1 If M1 scored from 84 indicated on graph, ft from cf graph. If M1 not scored from 84 indicated on graph, ft only from a correct curve / line segments. If their answer comes from their curve (± ½ sq) then award M1A1.
				Total 8 marks

Question	Working	Answer	Mark	Notes		
12. (a)	167.4 – 155 (= 12.4) "12.4" ÷ 155 (= 0.08)	8	3	M1 M1 dep A1 cao If build up approach used, award M2A1 for correct answer, otherwise M0A0.	167.4 ÷ 155 (= 1.08) "1.08" – 1 (= 0.08)	167.4 ÷ 155 (= 1.08) "1.08" × 100 (= 108)
(b)	$\frac{125.4}{104.5} \times 100$ oe	120	3	M2 M1 for $\frac{125.4}{104.5}$ (= 1.2) or 104.5% = 125.4 or $1.045x = 125.4$ oe or 1.2 seen or 5.4 A1 If build up approach used, award M2A1 for correct answer, otherwise M0A0.		
						Total 6 marks

Question	Working	Answer	Mark	Notes	
13.	$(AC^2=)\ 10^2 + 10^2$ (=200) $(AC=)\ \sqrt{(10^2 + 10^2)}$ (= 14.1...) $\pi \times \sqrt{(10^2 + 10^2)}$ oe or 14.1π or $2\pi \times 7.07$ **Alternative method:** M1 $\cos 45 = \frac{10}{x}$ or $\sin 45 = \frac{10}{x}$ M1 dep $(x=)\ \frac{10}{cos45}$ or $(x=)\ \frac{10}{sin45}$ oe (= 14.1..) M1 dep $\pi \times \frac{10}{cos45}$ or $\pi \times \frac{10}{sin45}$ oe	44.4	4	M1 M1 dep M1 dep M1 M1dep M1 dep A1 awrt 44.3 or 44.4	$(AO^2 =)\ 5^2 + 5^2$ (= 50) $(AO =)\ \sqrt{(5^2 + 5^2)}$ (=7.07..) $2 \times \pi \times \sqrt{(5^2 + 5^2)}$
					Total 4 marks

Question	Working	Answer	Mark	Notes
14. (a) (i)	$12x + 10y = 180$		1	B1 Accept 12x = 180 – 10y or 10y = 180 – 12x
(ii)	$(A =)\ 4x \times 2y$ $(A =)\ 4x \times 2(18 - 1.2x)$	proceed to $A = 144x - 9.6\ x^2$	2	M1 $4x \times 2y$ or $8xy$ oe A1 $4x \times 2(18 - 1.2x)$ or $8x(18 - 1.2x)$ or $4x(36 - 2.4x)$ oe **AND** proceeding correctly to $A = 144x - 9.6\ x^2$
(b)		$(dA/dx =)\ 144 - 19.2x$	2	B2 B1 for 144, B1 for $-19.2x$ Do not isw
(c)	"$144 - 19.2x$" = 0 $x = 7.5$ ($y = 9$) $(A =)$ 144 x "7.5" – 9.6 x "7.5^{2}" or $(A =)$ 8 x "7.5" x "9"	540	3	M1 ft Must be a 2 part linear expression M1 dep A1
				Total 8 marks

Question	Working	Answer	Mark	Notes
15.	3^2 or 9 $3^2 \times 4$	32	3	M1 3^2 used or identified as area scale factor M1 $3^2 \times 4$ or 9×4 or 36 or $3^2 \times 4 - 4$ or $(3^2 - 1) \times 4$ or 8×4 A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
16.	$(x \times x =)\ 4 \times 9\ (=36)$ $x = \sqrt{36}$	6	2	M1 for 4×9 or 36 A1 accept – 6
				Total 2 marks

Question	Working	Answer	Mark	Notes
17.	$y^2 = \frac{2x+1}{x-1}$ $y^2(x-1) = 2x+1$ $y^2x - y^2 = 2x+1$ $y^2x - 2x = y^2 + 1$	$x = \frac{y^2+1}{y^2-2}$ oe	4	M1 squaring both sides to get a correct equation M1 removing denominator to get a correct equation M1 correctly gathering *x*s on one side of a correct equation with non *x* terms on the other side A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
18.	$(A =)$ 0.5 x $(4 + k)$ x $\sqrt{3}$ $(= 5\sqrt{6})$ oe $k + 4 = \frac{10\sqrt{6}}{\sqrt{3}}$ $(k =) 2 \times \frac{5\sqrt{6}}{\sqrt{3}} - 4$ or $(k =) \frac{5\sqrt{6}-2\sqrt{3}}{0.5\sqrt{3}}$ oe	$(k =) 10\sqrt{2} - 4$	3	M1 $4\sqrt{3} + 0.5(k - 4) \times \sqrt{3}$ oe M1 correctly isolating k A1 Accept $2(5\sqrt{2} - 2)$ but don't accept $10\sqrt{2} - 4$ followed by $5\sqrt{2} - 2$
				Total 3 marks

Question	Working	Answer	Mark	Notes
19.	2.85 x 60 ÷ 4.5 oe	38	3	M2 M1 for 4.5 **or** 2.85 selected or used. Accept $4.4\dot{9}$ or $2.84\dot{9}$ A1 38 must come from correct working, although 38 without working gets M2A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
20. (a)	$\frac{4}{9}\times\frac{3}{8}\left(=\frac{12}{72}\right)$	$\frac{12}{72}$ or $\frac{1}{6}$ oe	2	M1 A1 accept 0.167 or better
(b)	$\frac{2}{9}\times\frac{3}{8}$ $\left(=\frac{6}{72}\right)$ oe or $\frac{3}{9}\times\frac{2}{8}\left(=\frac{6}{72}\right)$ oe or $\frac{4}{9}\times\frac{2}{8}\left(=\frac{8}{72}\right)$ oe or $\frac{2}{9}\times\frac{4}{8}\left(=\frac{8}{72}\right)$ oe $\frac{2}{9}\times\frac{3}{8}+\frac{3}{9}\times\frac{2}{8}+\frac{4}{9}\times\frac{2}{8}+\frac{2}{9}\times\frac{4}{8}$ $\left(=\frac{28}{72}\right)$ oe	$\frac{7}{18}$ oe	3	M1 1 correct branch M1 4 correct branches with intention to add A1 accept 0.389 or better.
	Alternative to (b) : with replacement $\frac{2}{9}\times\frac{3}{9}\left(=\frac{6}{81}\right)$ oe or $\frac{3}{9}\times\frac{2}{9}\left(=\frac{6}{81}\right)$ oe or $\frac{4}{9}\times\frac{2}{9}$ $\left(=\frac{8}{81}\right)$ oe or $\frac{2}{9}\times\frac{4}{9}$ $\left(=\frac{8}{81}\right)$ oe $\frac{2}{9}\times\frac{3}{9}+\frac{3}{9}\times\frac{2}{9}+\frac{4}{9}\times\frac{2}{9}+\frac{2}{9}\times\frac{4}{9}$ $\left(=\frac{28}{81}\right.$ oe $)$			**NB: Use of this method can score all available M marks, but cannot score the Accuracy (A) mark.** M1 M1
				Total 5 marks

Question	Working	Answer	Mark	Notes
21. (a)		$\frac{3}{5}$	1	B1 $\frac{3}{5}$ or 0.6
(b)		$(x =) -4$	1	B1 accept $x \neq -4$
(c)		(a =) 2	1	B1
(d)	$g(1) = 6$	$\frac{3}{10}$	2	M1 $\frac{3}{4+5+1}$ or $\frac{3}{4+6}$ or 6 or f(6) A1 $\frac{3}{10}$ or 0.3
(e)	$\frac{3}{4+5+x}$	$\frac{3}{9+x}$	2	M1 A1 cao
				Total 7 marks

Question	Working	Answer	Mark	Notes	
22. (a)	$\frac{8}{sin35} = \frac{BC}{\sin(180-65)}$ or $\frac{sin35}{8} = \frac{\sin(180-65)}{BC}$ ("BC" =) $\frac{8sin"115"}{sin35}$ oe	12.6	3	M1 for correct substitution into the sine rule M1 dep A1 awrt 12.6	Condone use of 65 instead of 115
(b)	0.5 x 8 x "12.6" sin (180 – 115 – 35) oe (= 25.28..) 65/360 x π x 8^2 (=36.30) "25.28" + "36.30"	61.6	4	M1ft 0.5 x 8 x "12.6" sin (180 – 115 – 35) oe or 25.2 – 25.3 "12.6" must be from clear final answer from (a) to allow ft M1 Accept $\frac{65}{360} \times 201...$ or $\frac{104\pi}{9}$ oe or 36.3... (correct to the first 3 SF) M1 dep on M2 A1 61.5 - 61.6	
					Total 7 marks

Question	Working	Answer	Mark	Notes
23.	$\frac{3(x-3)+4(x+2)}{(x+2)(x-3)}$ or $\frac{3(x-3)}{(x+2)(x-3)}+\frac{4(x+2)}{(x+2)(x-3)}$ (=2) $3(x-3)+4(x+2)=2(x+2)(x-3)$ $7x-1=2(x^2-x-6)$ oe $2x^2-9x-11$ (= 0) $(2x-11)(x+1)$ (=0)	$x=-1$ $x=5.5$ oe	5	M1 correct single fraction M1 correct removal of denominator to give a correct equation A1 correct 3 part quadratic (eg $2x^2-9x-11$ (= 0) or $2x^2-9x=11$ or $2x^2=9x+11$ oe) M1 for $(2x-11)(x+1)$ (=0) or a fully correct substitution into the quadratic formula *eg* $\frac{--9\pm\sqrt{(-9)^2-4\times2\times-11}}{2\times2}$ condone no brackets around – 9 or $\frac{9\pm\sqrt{169}}{4}$ A1 dep on last M1
				Total 5 marks

				TOTAL FOR PAPER: 100 MARKS

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